

NOV 26 1995

Computational Science 260

Trial Exam

1. Let L be a list consisting of a mixture of numbers and other text, and let $\text{number}(X)$ be a predicate which succeeds if X is a number. Write a Prolog predicate $\text{total}(L, \text{Sum})$ which succeeds if the sum of all numbers contained in L is equal to sum .
2. Let $a[i], i = 1..6$ be an array of integers in some computer language. Furthermore, let X be a set, containing 6 elements.
 - (a) Find a method to represent a function $f : X \rightarrow \mathbb{N}$ by using only the array a .
 - (b) What data structure would you use to store the function $f : X \times X \rightarrow Y$.
3. Let $A = \{a, c, d\}$, and let $B = \{c, d, e\}$. Find $\{x | ((x \in A) \vee (x \in B)) \wedge \neg(x \in A \cap B)\}$.
4. Let R be a relation. Prove that $R - R^\sim$ is always irreflexive and antisymmetric.
5. Functions are relations with special properties. List these properties. If f and g are two functions, is $f \cap g$ also a function. Do this by verifying the properties of $f \cap g$.
6. What are the conditions that must be met in order for a partial function to have an inverse.
7. Create two relations R and S in roster notation, and find $R \cup S, R \cap S$, and $R \circ S$.
8. At the end of the year, all the grades of all classes a student took are recorded. Design a Z schema which allows you to find what grade a student ~~obtain~~
obtained in any give class. Work out all the exceptions as well.